4. $x'_t = (a_1 f + g)x + a_2 f y + a_3 f z,\ \ y'_t = b_1 f x + (b_2 f + g)y + b_3 f z,\ \ z'_t = c_1 f x + c_2 f y + (c_3 f + g)z.$

Here, $f = f(t)$ and $g = g(t)$.

The transformation

$$x = \exp\left[\int g(t)\,dt\right]u, \quad y = \exp\left[\int g(t)\,dt\right]v, \quad z = \exp\left[\int g(t)\,dt\right]w, \quad \tau = \int f(t)\,dt$$

leads to the system of constant coefficient linear differential equations

$$u'_\tau = a_1 u + a_2 v + a_3 w, \quad v'_\tau = b_1 u + b_2 v + b_3 w, \quad w'_\tau = c_1 u + c_2 v + c_3 w.$$

